

Teachers' Digital Competence and Effective Classroom Instructional Delivery in Senior Secondary Schools in Port Harcourt Metropolis, Rivers State

Blessing Philip Ikechukwu¹, Hillary Wordu Ph.D² & Awajiokinor E. MBABA³

^{1,2,3}Department of Educational Foundations, Faculty of Education, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt.

*Corresponding Author: Blessing Philip Ikechukwu

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Article History	Abstract
Original Research Article	<i>This study examined teachers' digital competence and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis. The study was guided by five research questions and five hypotheses. The population of the study was 1,877 teachers. Correlational Research Design was adopted for the study. Krejcie and Morgan (1970) sample size table was used to arrive at a sample size of 320. Multistage sampling technique was adopted to sample the 320 teachers across the schools in the two Local Government Areas in Port Harcourt Metropolis. Two self-structured questionnaires titled Teachers Competence Inventory for the independent variable and Classroom Lesson Delivery Questionnaire for the dependent variable were used for data collection. The two instruments were designed using four-point rating scale of strongly agree, agree, disagree and strongly disagree. The validation of the instrument was ascertained by two experts of Educational Technology and one in Measurement and Evaluation of the Department of Educational Foundations, Rivers State University, Port Harcourt. The reliability of the instruments was tested using 30 teachers from Government Army Secondary School Elele, Ikwerre Local Government Area, and overall indices of 0.82 for Teachers Competence Inventory and 0.79 for Classroom Lesson Delivery were obtained using Cronbach Alpha statistics. The data collected was analyzed using Pearson's Product Moment Correlational (PPMC) statistics to answer research questions and test hypotheses at 0.05 level of significance. The findings revealed strong positive relationship between teachers' digital competence and effective classroom instructional delivery in Smartphones, Open Educational Resources, PowerPoint, WhatsApp, while YouTube obtained moderate relationship. The hypotheses were rejected because there were significant relationships across all areas of digital technology. Therefore, it was recommended that regular orientation on the changes in the smartphones apps be given to keep teachers acquainted with what is new in the use of Smartphones.</i>
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Introduction

The business of teaching is one that demands teachers' continuous development and serious commitment in innovations. This is imperative because the act of teaching is challenging and learners are equally evolving, methodology requirement in teaching is also dynamic, new research and new findings are turned out on contents taught in schools. In fact, the history of changes in teaching methodology is traceable to the time when the best media ever used in the classroom was the chalk board, then called

the blackboard. With continuous innovations, radio broadcasting instruction was introduced and development of instructional materials for different subjects emerged. The trend is not relenting as the learners' behaviours are influenced by their environment. The twenty-first century learners are driven by diverse technologies, this implies that as technology evolves and needs of the society change, teachers need to move on the part of progress in line with the desire of the society and the demand of the generation

of learners they teach (Mbaba & Atuzie, 2024). For instance, the present modern age and postmodern age are unique courtesy of technology, just as every age has its unique characteristics that shape their desire across social life and education. The high involvement of technologies in the modern and postmodern age makes it the digital age and that influences what the teacher should teach, how it should be taught, where, when and with what media it should be taught.

The rapid development of digital technology has led to a major transformation in contemporary society and digital competence is a prerequisite for effective teaching and learning in the twenty-first century. As technology has become increasingly integrated into instructional processes in educational systems, instructors are expected to have the digital knowledge and skills to support effective learning experiences. Digital competence has become a professional requirement rather than a desirable characteristic as a result of the increased dependence on Information and Communication Technology (ICT) and the fact that the educational, social and employment development of citizens is increasingly dependent on the effective and responsible use of digital technologies. Similarly, in an era of ubiquitous technology, learners are more engaged in technology-rich environments and educators need to embrace creative pedagogical approaches consistent with their digital experiences and learning preferences (Basilotta-Gómez-Pablos et al., 2022). In response to these advancements, educational curriculum have grown more interactive, learner-centred and technology-driven, allowing teachers to use digital tools that increase students engagement and academic success. As a particular to the discipline, the tight link of science education with technological progress has led to major transformation. This relationship has been a driving force behind various international educational reforms, such as the *Next Generation Science Standards* (NGSS) and the Science, Technology, Engineering and Mathematics (STEM) framework, both of which emphasize the incorporation of technology as a fundamental aspect of scientific education (Brynildsen et al., 2022). Thus, many educational programs have set up professional standards to enhance teachers' digital competency and to promote the appropriate use of digital technology in science education. The educational significance of digital competence is in the teachers' ability to develop interactive, immersive, and flexible learning environments that support blended and distance learning and help students understand complex and abstract scientific concepts through technology-supported instructional methods (Althubyani, 2024).

The digital competence of teachers is more than the capacity to use digital devices or software applications. It

involves a complete spectrum of technical, cognitive, pedagogical and communicative abilities needed to ensure success in educational, professional and social settings (Gallego et al., 2025). Strategic integration of the right digital technologies in instructional practice enhances the effectiveness of teaching and the professional profile of teachers, as it improves learner engagement, instructional quality, and teacher-student interaction (Manjarrez-Yépez et al., 2023). The process of implementation is complicated by the simultaneous development of digital competencies of both instructors and pupils, which is necessary for a meaningful digital transformation in education. Therefore, there is a need for continuous professional development and formal training programmes to equip teachers with the skills required to effectively leverage new technologies, to integrate digital tools in classroom practice and to respond to the evolving demands of technology-enhanced education.

Cabero et al. (2021) identified digital competence as one of the basic competences demanded of today's citizens and, more especially, of teachers working in increasingly digitalized educational environments. Despite several definitions of teachers' digital competence proposed by scholars, the variances are mostly due to different views on the role and use of information and communication technology in education. For pedagogical reasons, a teacher's digital competence is a set of knowledge, practical skills, values and professional attitudes which enable the educator to use digital technologies effectively in the technological, informational, communicative, multimedia, collaborative and ethical dimensions. This competence also requires teachers to apply sound pedagogical and didactic principles when integrating the ICT into instructional practice, ensuring that the digital technologies meaningfully support the teaching, learning, assessment and professional responsibilities in formal and non-formal educational settings (Basilotta-Gómez-Pablos, 2022). Thus, teachers' digital competence should be regarded as a professional skill with several dimensions that enables the effective pedagogical implementation of technology, not only a technical skill.

Competence, in a larger sense, is a person's ability to use learned information and practical abilities as well as accumulated experience in an effective, correct and responsible way in the implementation of specified activities or professional functions (Olivia et al., 2015). Building on this perspective, Olga (2018) suggests that competence involves not only knowledge and technical skills, but also the capacity to respond successfully to complex challenges by mobilizing cognitive, behavioural, emotional and psychosocial resources in specific contexts. In the current educational environment, with its fast

technology developments and changing learner needs, instructors need a wide range of abilities that enable them to respond adequately to the rising complexity of instructional demands. These competencies include not only the operation of digital technologies but also the pedagogically sound integration of mobile learning applications, digital instructional resources, collaborative technologies and other innovative educational tools which could enhance teaching effectiveness and improve students' learning experiences in a variety of educational settings.

Digital skills were defined by the United Nations Educational, Scientific and Cultural Organization (2020) as a set of skills to use digital devices, communication apps and networks to obtain and manipulate information. They allow people to produce and share digital information, interact and collaborate, and solve problems for the effective and creative self-fulfillment in life, study, work, and social activities in general. Tretnjak et al., (2016) indicated that there are five digital competence areas that all teachers are expected to be knowledgeable with in order to make learning and teaching effective, such as information, communication, security, issue solving and content production. Ferrari summed everything up when he remarked that:

“The set of knowledge, skills and attitudes (abilities, strategies, values) are required when using ICT and digital media to perform tasks, solve problems, communicate, manage information, collaborate, create and share content and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically and reflectively for work, leisure, participation, learning, socialising, consuming and empowerment (Ferrari, 2012 p.34)”.

Fernando (2021) says that teachers need a wide range of digital skills to be effective in modern learning environments, including programming, web and application development, digital business analysis, digital marketing, content creation, digital design, data visualization, digital product management, data science, and user experience design. Similarly, Ashutosh (2018) found certain digital technologies which can increase instructional delivery and they are Edmodo, Socrative, ThingLink, Projeqt, ClassDojo, CK-12, EduClipper, Storybird, Animoto, Kahoot! and TED-Ed. However, the choice and use of these tools should be based on certain teaching objectives, the needs of the learners, and the intended learning outcomes. With the continued transformation of educational practice by digital technologies, teachers must have the abilities to integrate digital tools into teaching and learning processes,

particularly for the successful adoption of mobile learning applications (Onyebuenyi et al., 2022). Moreover, Osuji et al. (2015) noted that digital competence involves the evaluation of learning, requiring educators to be adept at creating and implementing both formative and summative evaluations in digital contexts. This includes establishing online tests, assignments, group projects, and discussion boards that provide quick, positive, and personalized feedback. The authors also suggest that there is a need for continuous professional development in the use of a range of digital assessment approaches, such as peer assessment, electronic portfolios, and automated assessment systems, to improve the accuracy, efficiency, and overall quality of learner evaluation in technology-enhanced educational settings.

Digital application refers to the systematic use of digital tools, resources, and technologies to enhance the process of knowledge delivery, acquisition, and management in educational settings. It encompasses the integration of Information and Communication Technologies (ICTs), software programs, mobile applications, cloud platforms, and multimedia resources into teaching and learning activities. In schools, digital applications are not merely tools but transformative instruments that reshape how students access information, interact with content, and collaborate with peers and teachers (Adebayo et al., 2021). The concept is rooted in digital competence, which demands that both teachers and learners acquire the skills to effectively use technology for academic purposes.

One significant effect of digital applications in schools is their impact on instructional delivery. Teachers can utilise interactive whiteboards, e-learning platforms, and educational applications to design engaging lessons that transcend traditional chalk-and-board methods. For instance, applications such as Google Classroom, Edmodo, and Microsoft Teams enable the delivery of digital lessons, assignments, and assessments in real time (Okoye et al., 2020). This ensures flexibility in content delivery, accommodates learners of diverse abilities, and enhances learner participation. By offering multimedia-based learning experiences such as videos, animations, and simulations digital applications make abstract concepts more concrete and comprehensible.

Digital applications foster student-centered learning approaches, where learners take active roles in constructing knowledge. Platforms that promote collaboration, such as Padlet or Zoom breakout rooms, allow students to engage in cooperative learning activities, peer discussions, and project-based learning (UNESCO, 2021). Such tools give learners autonomy and encourage critical thinking, creativity, and problem-solving. Beyond content mastery, students develop digital literacy skills that are essential for

participation in the 21st-century knowledge economy (Voogt et al., 2019).

Another effect of digital applications is their ability to promote access and inclusion in schools. Through e-learning platforms and mobile applications, students can learn anytime and anywhere, breaking geographical and temporal barriers (Umar et al., 2020). Digital resources are particularly beneficial for learners with disabilities, as assistive technologies such as screen readers, voice recognition tools, and captioned videos enable inclusive learning experiences. By reducing educational inequalities, digital applications contribute to achieving global education goals, especially in contexts where resources are limited but mobile devices are prevalent.

Despite the numerous benefits, the use of digital applications in schools also presents challenges. Many teachers, especially in developing countries, lack the digital competence and confidence required to integrate technology effectively into instruction (Eze, 2019). Additionally, infrastructural constraints such as poor internet connectivity, lack of digital devices, and inadequate technical support hinder effective application. These challenges highlight the need for teacher training, policy support, and investment in educational technologies to maximise the benefits of digital applications.

Another area of concern is the lack of technical support to teachers and students in senior secondary schools in Rivers State. A situation where equipment that is donated or purchased often becomes unusable because there are no local technicians, spare parts, or maintenance budgets for such; teachers then face tools that are broken or obsolete and receive no funding for repairs. Studies in the region report that lack of maintenance and poor asset management lead to rapid deterioration of ICT resources, undermining teacher motivation to develop or sustain digital competencies (Osuji et al., 2023). Socio-economic inequality and differential access among schools with disparities between private and public schools and between urban and rural catchments within Rivers State create uneven opportunities for teachers to build digital competence. Research assessing teacher skills in the metropolis highlights significant variation in competency areas (e.g., internet-surfing, presentation design) that correlates with differences in resource availability and school funding. Where teachers and students lack personal devices or cannot afford data, whole classes are excluded from digital pedagogies and teachers have little incentive or opportunity to become proficient. Addressing these equity gaps is therefore central to any plan for raising teachers' digital competence across the metropolis (Wordu et al., 2022).

Therefore, in the context of this study digital competence is the collective ability across digital skills, management, application, ethics, attitude and administration in information management in the classroom. It is the capacity to manipulate the digital tools for the purpose of meeting the objective of a lesson but in total adherence to security, ethics and learners' concerns. These digital tools include Smartphones, Open Educational Resources (OER), PowerPoint, WhatsApp, YouTube, and more.

Teachers' competence in smartphone use refers to their ability to effectively leverage mobile devices to support teaching and learning activities such as accessing educational apps, conducting research, communicating with students, and sharing instructional materials. Smartphones have emerged as ubiquitous learning tools that can mitigate infrastructural challenges in many secondary classrooms, enabling quicker access to digital content without dependence on traditional lab computers. Research emphasises that teachers' familiarity and confidence with mobile learning devices are essential to integrate them meaningfully into pedagogy, as these devices can support collaborative learning and extend educational interactions beyond class hours.

Competence in Open Educational Resources (OER) encompasses teachers' ability to locate, evaluate, adapt, and integrate freely available educational materials into instruction. Open Educational Resources (OER) can include digital textbooks, interactive simulations, multimedia files, and pedagogical resources that support differentiated instruction and modern curriculum demands. Research demonstrates that digital competence is strongly linked to teachers' capacity to use and produce OER effectively, as teachers who perceive themselves as digitally competent are more likely to engage with and adapt these resources to improve lesson quality. Training in digital competence has been found to significantly increase OER use, showing that professional development should intentionally focus on building these skills to promote innovation in instructional delivery.

Teachers' competence in WhatsApp involves the effective use of the WhatsApp platform for instructional communication, collaboration, and feedback. WhatsApp enables teachers to create learning groups, distribute materials, share voice explanations, and maintain academic discussions beyond classroom hours. Studies indicate that WhatsApp enhances student participation and continuous learning when used with clear instructional purpose (Onisoya & Mbaba). Furthermore, digital competence frameworks emphasise that teachers must demonstrate professional engagement and responsible communication in online environments (European Commission, 2018). In contexts where formal Learning Management Systems are

limited, WhatsApp serves as a practical mobile-learning tool that supports blended learning. Thus, teachers' competence in WhatsApp contributes significantly to extending classroom interaction and improving instructional delivery effectiveness.

Teachers' competence in YouTube refers to their ability to search, evaluate, curate, and integrate educational videos into classroom teaching. YouTube provides diverse instructional materials that can enhance visualisation of abstract concepts and support differentiated learning (Mbaba, 2024). Research indicates that effective integration of online video resources improves students' understanding and motivation when aligned with curriculum objectives (Dubovi et al., 2020). The DigCompEdu framework also highlights the importance of teachers' ability to select and adapt digital content responsibly and critically (European Commission, 2018). Competent teachers not only consume content but may also create and upload instructional videos to support revision and flipped classroom approaches. Therefore, YouTube competence represents an important dimension of digital instructional delivery in contemporary secondary education.

Classroom lesson delivery is a vital aspect of teaching and learning in the conventional secondary schools. In Rivers State, teachers are exposed to the use of technology to support teaching and learning and to improve students' performance. There is equally the demand for high engagement in the classroom and outside the classroom, which attracts the use of technology. This is on the background that young people get their news and information from various digital sources, including smartphones, tablets, and laptops. There is a rising trend among today's teachers to supplement traditional education methods with ICT in line with the findings of researches that recommend instructors' competency in incorporating ICT into their lessons (Faremi, et al.). Despite digital competence being highlighted in curriculums' frameworks, there is still a gap in understanding how to efficiently integrate digital platforms into the actual classrooms. Much of existing literature shows that the educational system focuses more on equipping the classrooms with digital tools and platforms, without providing specific guidance on how it can be aligned with curricular aims, particularly in fostering digital competence (Ahmadjan, 2024; Kure, et al., 2022). Therefore, the effectiveness of digital competence of teachers on lesson among secondary schools raises questions as to whether teachers are indeed competent and whether they are using these skills in the classroom particularly in Rivers State. Thus, the need to investigate teachers' digital competence and effective classroom

instructional delivery in Senior Secondary Schools in Port Harcourt Metropolis has become very imperative.

Statement of the Problem

The increasing adoption of digital technologies in education has transformed the way teaching and learning are conducted across the world. In the twenty-first century, teachers are expected to possess adequate digital competence to effectively integrate technology into lesson planning, classroom instruction, assessment, communication, and professional development. Digital competence goes beyond the ability to operate computers; it includes the knowledge, skills, attitudes, and confidence required to use digital technologies responsibly and effectively to improve teaching and learning outcomes (Redecker, 2017). Consequently, educational systems worldwide have placed greater emphasis on developing teachers' digital competence as a means of improving instructional quality and preparing learners for participation in a technology-driven society (Caena & Redecker, 2019).

In Nigeria, the Federal Government has introduced several policies aimed at integrating Information and Communication Technology (ICT) into the education system. Similarly, the Rivers State Government has invested in ICT facilities and encouraged schools to adopt technology-enhanced teaching practices. Despite these efforts, the level of digital technology integration in many senior secondary schools remains relatively low. Classroom instruction in many schools continues to rely heavily on traditional teaching methods, with limited utilisation of digital instructional resources. This situation raises concerns about whether teachers possess the necessary digital competence required for effective classroom instructional delivery. Therefore, the fundamental problem addressed in this study is the persistent inadequacy of classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis due to limited teachers' digital competence and underutilisation of ICT tools. While national policies advocate for greater ICT integration, it remains uncertain whether teachers possess the necessary digital competencies to leverage these tools for effective instructional delivery. This study thus seeks to empirically examine the relationship between teachers' digital competence and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

It is not clear whether senior secondary school teachers' digital competence skills in Rivers State relate to effective instructional delivery in the classroom, it is not also certain, what the basic challenges facing the applications of digital skills for classroom instructions are or the impact of gender in the application of digital competence in lesson delivery. Thus the need to investigate teachers' digital competence

and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Purpose of the Study

The purpose of this study was to investigate relationship between teachers' digital competence and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis, Rivers State. Specifically, the objectives of this study were to;

1. determine the relationship between teachers' competences in smartphone and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis;
2. determine the relationship between teachers' competences in Open Educational Resources (OER) and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.
3. determine the relationship between teachers' competences in WhatsApp and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Research Questions

The following research questions guided the study:

1. What is the relationship between teachers' competences in smartphone and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis?
2. What is the relationship between teachers' competence in Open Educational Resources (OER) and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis?
3. What is the relationship between teachers' competences in WhatsApp and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Hypotheses

The following null hypotheses were formulated to guide the study and tested at 0.05 level of significance.

1. There is no significant relationship between teachers' competences in smartphone and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.
2. There is no significant relationship between teachers' competences in Open Educational Resources (OER) and effective classroom

instructional delivery in senior secondary schools in Port Harcourt Metropolis.

3. There is no significant relationship between teachers' competences in WhatsApp and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

The process of integrating technology into education is a difficult one, presenting both opportunities and challenges for educators. Technology refers to old and modern tools, including analogue and digital developments, each with its own features that influence how they are used in education. Digital technologies in particular have intrinsic properties that may assist or inhibit successful teaching and learning. Their introduction into classroom practice is more difficult than the gaining of technical skills. Thus, for effective technology integration, teachers must understand that technologies are not neutral or one-size-fits-all. Each technology has unique affordances, limitations, and pedagogical potentials that determine the appropriateness for particular instructional purposes. For example, email is very good for asynchronous communication, documenting and sharing of information but it is not immediate, interactive and does not convey non-verbal signs as face to face, telephone or instant messaging does. Therefore, teachers need to understand the affordances and restrictions of different technologies and how they affect instructional design, classroom interaction and student learning. As argued by Koehler et al. (2009), to develop such understanding, rethinking of teacher education and continuous professional development programmes is needed to equip teachers with the pedagogical knowledge and technological competencies needed to make informed decisions about the effective integration of digital technologies into teaching and learning.

Methodology

The study utilized a correlational survey research approach to investigate the association between teachers' digital competency and successful instructional delivery in public senior secondary schools in Port Harcourt Metropolis, Rivers State. This strategy was appropriate as it allowed the researcher to identify the nature and strength of the association between the study variables without manipulation. The study was carried out in Port Harcourt Metropolis comprising Port Harcourt City and Obio/Akpor Local Government Areas of Rivers State. The population under study was all the instructors in the public senior secondary schools in the city. There were 1,877 teachers, made up of 429 males and 1,448 females, from the Planning, Research and Statistics Department of the Rivers State Senior Secondary Schools Board (2024-2025). The sample size of 320 respondents was calculated from the sample size determination chart of Krejcie and Morgan

(1970) which gives a suitable sample for the finite population. The respondents were selected from public senior high schools in the two Local Government Areas using multistage selection technique to provide adequate representation of the study population and to enhance the generalizability of the findings.

The research instruments for data collection for this study were two self-structured questionnaires titled Teachers' Digital Competences Inventory (TDCI) for the independent variable and Classroom Lesson Delivery Questionnaire (CLDQ) for the dependent variable. Each of the questionnaires was divided into two parts, the first part provides the demographic data of the respondents while the second parts consist of twenty-five (25) items each. The participants were expected to respond appropriately to the two questionnaires. The two sets of questionnaires were based on a modified four-point rating scale of Strongly Agree (SA) =4 points, Agree (A) = 3 points, Disagree (D) =2 points and Strongly Disagree (SD) =1 point.

To ensure the reliability of the instrument 30 copies of both questionnaires were administered to 30 teachers from Government Army Secondary School (GASS) Elele, Ikwerre LGA, Rivers State. Teachers at GASS Elele did not

participate in the study. Their responses were analysed using Cronbach Alpha statistics and reliability indices of 0.82 and 0.79 were obtained as the coefficients for internal consistency for Teachers' Digital Competence Inventory (TDCI) and Classroom Lesson Delivery Questionnaire (CLDQ) respectively. The coefficients of internal consistency of the instruments were high enough for the instruments to be adjudged reliable for data collection. The copies of questionnaire collected were analysed using Pearson's Product Moment Correlational (PPMC) statistics to answer research questions and test hypotheses at 0.05 level of significance. PPMC is used because it produces single confident that summarize the relationship and easy to interpret.

The following are the guide for interpretation: 0.00-0.19 is very low, 0.20-0.39 is low, 0.40-0.59 is moderate, 0.60-0.79 is strong and 0.80 and above is very strong relationship.

Results

Research Question 1: What is the relationship between teachers' competence in smartphone and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis?

Table 1: Pearson's Product Moment Correlation Analysis showing Relationship between Teachers' Competence in Smartphone and Effective Classroom Instructional Delivery

Variables	ΣX	ΣY	$(\Sigma X)^2$	$(\Sigma Y)^2$	ΣXY	r-cal	Remarks
Teachers' Competence in Smartphone	807.65		652298.52		1947.26	0.76	Strong Positive Relationship
Classroom Instructional Delivery		746.4		557112.96			

Table 1 displays the outcome of Pearson's Product Moment Correlation Analysis on the association between teachers' competence in smartphone and effective classroom instructional delivery. The result shows a correlation coefficient of 0.763, which indicates a significant and favorable link. Thus, there is a significant positive association between the teachers' competency in

smartphone and successful classroom instructional delivery in Senior Secondary Schools in Port Harcourt Metropolis.

Research Question 2: What is the relationship between teachers' competence in Open Educational Resources (OER) and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis?

Table 2: Pearson's Product Moment Correlation Analysis showing Relationship between Teachers' Competence in Open Educational Resources (OER) and Effective Classroom Instructional Delivery

Variables	ΣX	ΣY	$(\Sigma X)^2$	$(\Sigma Y)^2$	ΣXY	r-cal	Remarks
Teachers' Competence in OER	894.74		800559.67		2150.98	0.79	Strong Positive Relationship
Classroom Instructional Delivery		746.4		557112.96			

Table 2: Result of Pearson's Product Moment Correlation Analysis on the association between teachers' proficiency in Open Educational Resources (OER) and effective classroom instructional delivery. The result demonstrates that there is a strong positive link with a correlation

coefficient of 0.79. Therefore, the study found that there is a significant and positive association between teachers' proficiency in Open Educational Resources (OER) and successful classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Research Question 3: What is the relationship between teachers' Competence in WhatsApp and effective

classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis?

Table 3: Pearson's Product Moment Correlation Analysis showing Relationship between Teachers' Competence in WhatsApp and Effective Classroom Instructional Delivery

Variables	ΣX	ΣY	$(\Sigma X)^2$	$(\Sigma Y)^2$	ΣXY	r-cal	Remarks
Teachers' Competence in WhatsApp	887.89		788348.65		2118.19	0.68	Strong Positive Relationship
Classroom Instructional Delivery		746.4		557112.96			

The table above presents the outcome of Pearson's Product Moment Correlation Analysis on the association between teachers' competency in WhatsApp and effective classroom instructional delivery. The result reveals the correlation coefficient is 0.682, it shows that there is a significant and positive association. Hence, there is a significant and positive association between teachers' proficiency in WhatsApp and successful classroom

instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Hypotheses

Ho₁: There is no significant relationship between teachers' Competence in smartphone and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Table 4: Pearson Correlation showing relationship between teachers' smartphone competence and effective classroom instructional delivery

Variables	n	r-cal	df	A	t-crit	t-cal	Decision
Teachers' Competence in Smartphone	320	0.76	318	0.05	1.96	13.64	Ho Rejected
Classroom Instructional Delivery							

Table 4 illustrates the outcome of the Pearson's Product Moment Correlation of the association between teachers' competency in smartphone and effective classroom instructional delivery. The result demonstrates that there is a statistical significant association between teachers' Competence in smartphone and successful classroom instructional delivery as t-calculated value 13.64 is greater than t-critical value 1.96 at 0.05 level of significance. Therefore, the null hypotheses that there is no significant

association between teachers' proficiency in smartphone and successful classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis was rejected at 0.05 level of significance.

Ho₂: There is no significant relationship between teachers' competence in Open Educational Resources (OER) and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Table 5: Pearson's Product Moment Correlation Analysis showing Relationship between Teachers' Competence in Open Educational Resources (OER) and Effective Classroom Instructional Delivery

Variables	n	r-cal	df	A	t-crit	t-cal	Decision
Teachers' Competence in OER	320	0.79	318	0.05	1.96	14.13	Ho Rejected
Classroom Instructional Delivery							

Table 5 presents the Pearson's Product Moment Correlation result showing the relationship between teachers' Competence in Open Educational Resources (OER) and effective classroom instructional delivery. The result shows that there is a statistical significant relationship between

teachers' Competence in Open Educational Resources (OER) and effective classroom instructional delivery as t-calculated value of 14.13 is greater than t-critical value of 1.96 at 0.05 level of significance. Thus, the null hypothesis which states that there is no significant relationship

between teachers' Competence in Open Educational Resources (OER) and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis was rejected at 0.05 level of significance.

Ho3: There is no significant relationship between teachers' competence in WhatsApp and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis.

Table 6 Pearson's Product Moment Correlation Analysis showing Relationship between Teachers' Competence in WhatsApp and Effective Classroom Instructional Delivery

Variables	n	r-cal	df	α	t-crit	t-cal	Decision
Teachers' Competence in WhatsApp	320	0.68	318	0.05	1.96	12.17	Ho Rejected
Classroom Instructional Delivery							

Significant = $t\text{-cal} > t\text{-crit}$

Table 6 displays the Pearson's Product Moment Correlation result showing the relationship between teachers' Competence in WhatsApp and effective classroom instructional delivery. The result shows that there is a statistical significant relationship between teachers' Competence in WhatsApp and effective classroom instructional delivery as t-calculated value of 12.17 is greater than t-critical value of 1.96 at 0.05 level of significance. Therefore, the null hypothesis which states that there is no significant relationship between teachers' Competence in WhatsApp and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis was rejected at 0.05 level of significance.

Discussion of Findings

The study found a positive and significant association between teachers' smartphone proficiency and successful classroom instructional delivery in senior secondary schools in Port Harcourt metropolitan. The positive relationship was tested to find out if it is significant or not and the result showed significant relationship between teachers' smartphone competence and effective classroom instructional delivery in senior secondary schools in Port Harcourt Metropolis, therefore the hypothesis was rejected because there was significant difference. This favorable link can be due to the effectiveness of the teachers in using smartphones as a result of their proficiency in smartphone apps for teaching and learning in the classroom. This finding is in line with the work of Osuji and Woryi (2023) explored the competence of facilitators: panacea for efficient instructional delivery in Open and remote learning in higher education. The findings also showed that the facilitators' usage of digital information resources of National Open University of Nigeria (NOUN) in South-South Nigeria was explained by their digital competency level which has led to efficient instructional delivery.

The study was also in agreement with the study of Onyebuenyi et al. (2022) who determined the digital competencies needed by teachers for utilizing mobile learning applications for effective lesson delivery in Technical Colleges in Aba Education Zone of Abia State and the findings include that the ability to; provide students with task management tools to organize their work, exploit computer games for pedagogical purposes, create screen capture tutorials, being able to detect plagiarized works in students assignments are part of the digital skills needed by teachers for utilizing mobile learning applications for effective lesson delivery in technical colleges in Aba Education Zone. This position is further strengthened by Nwuke and Osuji (2024), who examined the management of digital learning environments in public schools in Rivers State and reported that mobile and other accessible digital tools offer learners personalised and flexible routes to instruction, provided teachers are adequately prepared to deploy them. Their observation that inadequate equipment, limited internet access and insufficient teacher preparation remain the principal obstacles helps to explain why competence in smartphones, devices teachers already own and use daily, correlates so strongly with instructional delivery in the present study. In summary, smartphones with adequate competence of teachers to manipulate the apps and devices for purpose of delivery of lesson is the way to go right. There are absolute relationship between smartphones competence and lesson delivery in senior secondary schools in Port Harcourt metropolis of Rivers State.

The competence of teachers on the use of Open Educational Resources OER in the delivery of instruction at the senior secondary schools in Port Harcourt metropolis and the result shows positive relationship, the null hypothesis was significance. This indeed is predicated on the fact that open educational resources have the capacity of improving learning outcomes, enhance lesson delivery, hence learners

are and teachers are able to use modify and reuse open educational resources. Thus, it ease the facilitation of lesson delivery in secondary schools. The finding that teachers' competence in Open Educational Resources (OER) has a positive relationship with effective instructional delivery aligns with earlier studies that highlight the pedagogical value of OER in secondary education. For instance, Afolabi (2019) found that teachers who demonstrate higher proficiency in locating, adapting, and integrating OER materials are more capable of delivering learner-centered instruction and improving student engagement. This supports the study's conclusion that OER competence enhances lesson quality, particularly in environments where access to teaching resources is limited. Similarly, Izuagba and Afurobi (2021) reported that teachers' digital openness and resource-adaptation skills significantly predicted improvements in curriculum implementation across Nigerian secondary schools, reinforcing the significance of the positive correlation observed.

Furthermore, the significance of the null hypothesis in the study also reflects broader evidence suggesting that OER competence does not operate in isolation but interacts with other pedagogical factors. Nwosu and Okoye (2020) observed that while OER competence contributes to effective teaching, its impact becomes more pronounced when teachers possess strong lesson planning and digital-integration skills. This means that statistically significant relationships between OER competence and instructional delivery such as the study recorded often emerge in systems where teachers actively integrate OER into structured instructional frameworks. In the same vein, Longjohn and Onyewuenyi (2025), writing on senior secondary schools in Port Harcourt Metropolis, argued that teacher-centred methods have contributed substantially to poor academic performance and retention, and that learner-centred instructional strategies yield better outcomes where teachers are equipped to manage them. Since Open Educational Resources are, by design, adaptable materials that support such learner-centred practice, their position lends contextual support to the present finding that OER competence produced the strongest correlation among the variables examined. These supporting studies collectively validate the findings of this study by demonstrating that OER competence is an important determinant of effective instructional practices in Nigerian senior secondary schools.

The present show a strong positive relationship between teachers' WhatsApp competence and effective classroom instructional delivery in senior secondary schools in Port Harcourt metropolis. This implies that the competence of teachers in the use of WhatsApp have enhances effective classroom lesson delivery.

The present findings that teachers' WhatsApp competence has strongly positive relationship to effective classroom instructional delivery aligns closely with Adejumo's investigation into mobile messaging platforms as instructional tools. Adejumo (2019) reported that teachers who effectively use WhatsApp for sharing lesson materials, giving timely feedback, and maintaining continuous teacher student communication achieved higher levels of lesson clarity and student engagement. This study demonstrated that competence in structuring messages, curating multimedia content, and managing group interactions directly improved the pacing and coherence of classroom lessons, which supports the findings of this result that WhatsApp skillfulness enhances overall instructional effectiveness.

The findings of this work also corroborates the work of Eze and Chukwu (2021), who found that WhatsApp-enabled collaborative learning and resource sharing positively influenced teachers' ability to deliver interactive and student-centered lessons. The mixed-methods study showed that teachers competent in using WhatsApp to facilitate discussions, distribute formative assessments, and coordinate peer activities reported greater instructional adaptability and higher perceived student participation. Evidence drawn from the immediate study area reinforces this. Longjohn (2022), investigating information sharing among secondary school principals in Port Harcourt Metropolis in the wake of COVID-19, found that social media platforms, WhatsApp being prominent among them, had become the everyday channel through which school personnel exchanged official and instructional information. That WhatsApp is already embedded in the professional communication habits of schools in this metropolis offers a plausible explanation for the strong positive relationship recorded in the present study, as teachers bring to instruction a platform in which they are already fluent. Together, these studies validate the implication from this present research that targeted development of teachers' WhatsApp competencies can be an effective strategy for improving lesson delivery in senior secondary schools.

Taken together, the three findings converge on a conclusion consistent with the wider literature on technology adoption in Rivers State schools. Nwuke and Yellowe (2025), in their examination of the utilisation of artificial intelligence in school supervision in public secondary schools in Rivers State, identified inadequate technological infrastructure, financial constraints and limited digital literacy as the recurring barriers to the productive use of digital systems in schools. The present study suggests that where those barriers are lowest, that is, in the use of personally owned smartphones, freely available open resources and a messaging platform already in daily circulation, teachers'

digital competence translates most directly into effective classroom instructional delivery.

Recommendations

Based on the findings of this study, the following recommendations were made to address each identified results:

1. Considering the positive relationship of digital competence in Smartphones and effective instructional delivery. Giving regular orientation or updates on the changes in the Smartphones apps to keep teachers acquainted with what is new in the use of Smartphones should be encourage.
2. Educational content creators, policymakers and institutions engaging in the use of OER should provide adequate guide and infrastructures required to engage teachers in the use of OER in schools.
3. WhatsApp platforms are commonly used for many purposes by teachers and students, because WhatsApp is good for corroborative learning, institutions and school administrators should design the strategies to control its usage and to ensure it is used basically for academic purposes in the school.

Conclusion

This study explored the relationship between teachers' digital competence and effective instructional delivery in Port Harcourt Metropolis of Rivers State. The focus of the study is on the digital competence of various platforms such as Smartphones, Open Educational Resources and WhatsApp on instructional delivery in the classroom. The study concludes that there is a strong positive relationship between digital competence and instructional delivery in the public senior secondary schools. Thus, the call for adequate improvement of digital competence among teachers through appropriate policy framework by policy makers, educational institutions technology developers among others. The improvement of teachers' competence in this direction will eventually enhance effective lesson delivery.

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